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CHARLES ROBERT OSTEN SACKEN,
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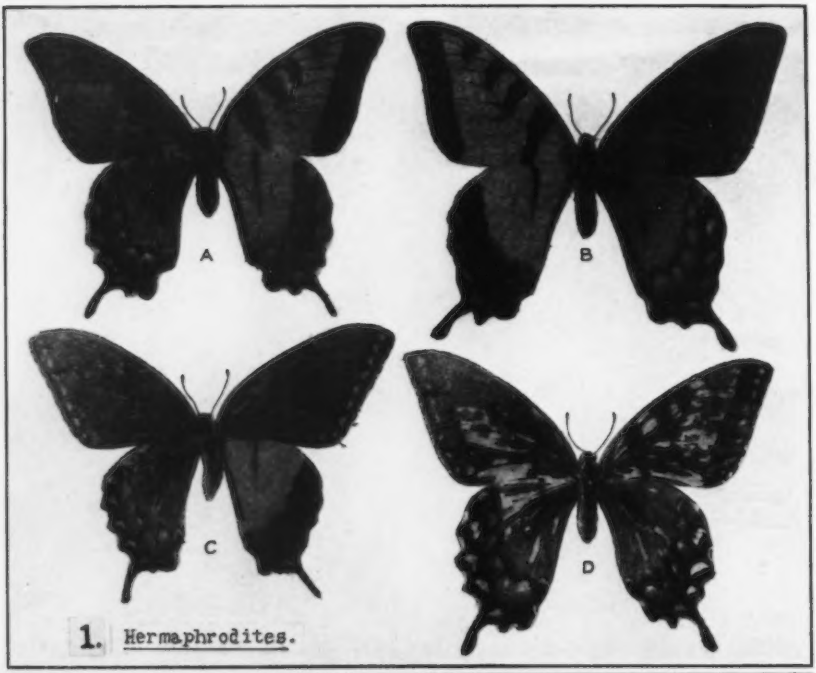

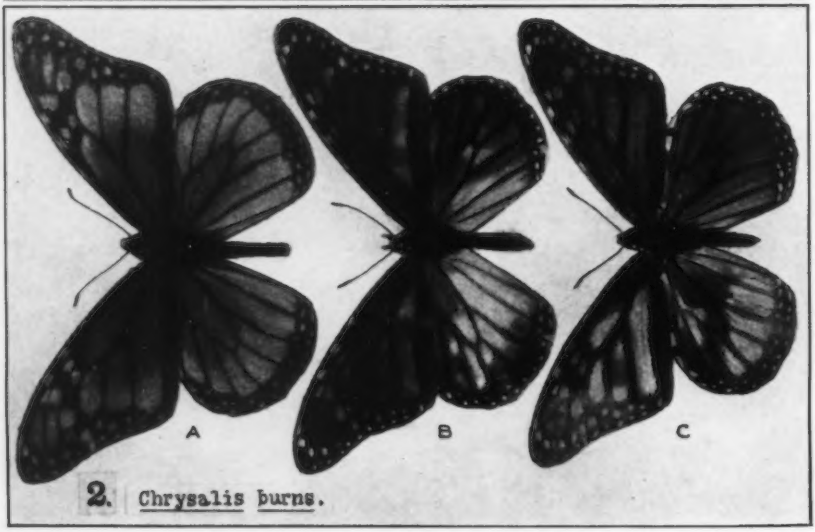

UNNAMABLE BUTTERFLIES.—GUNDER.

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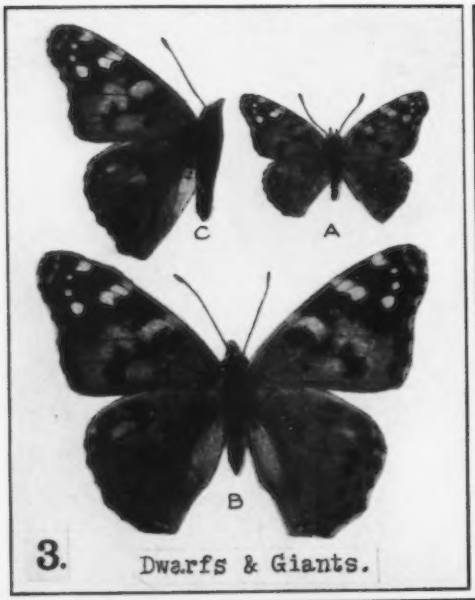
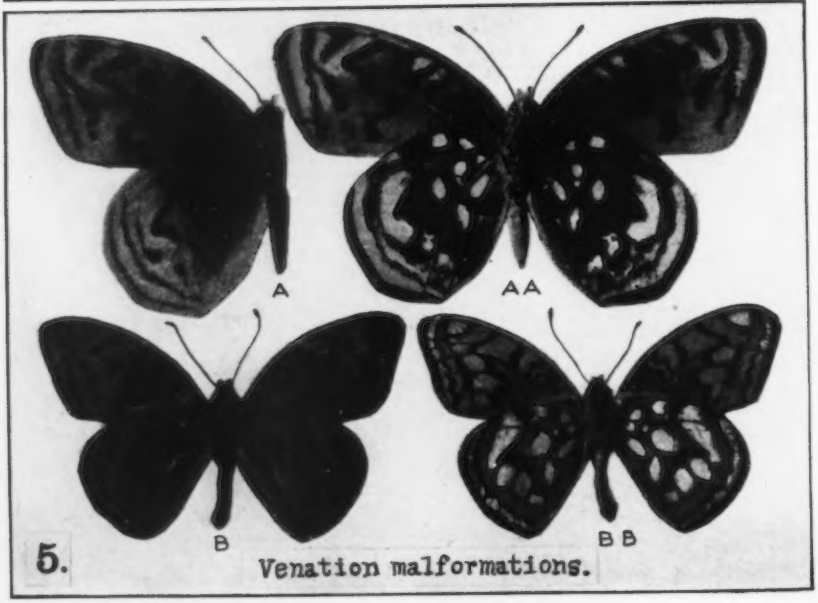


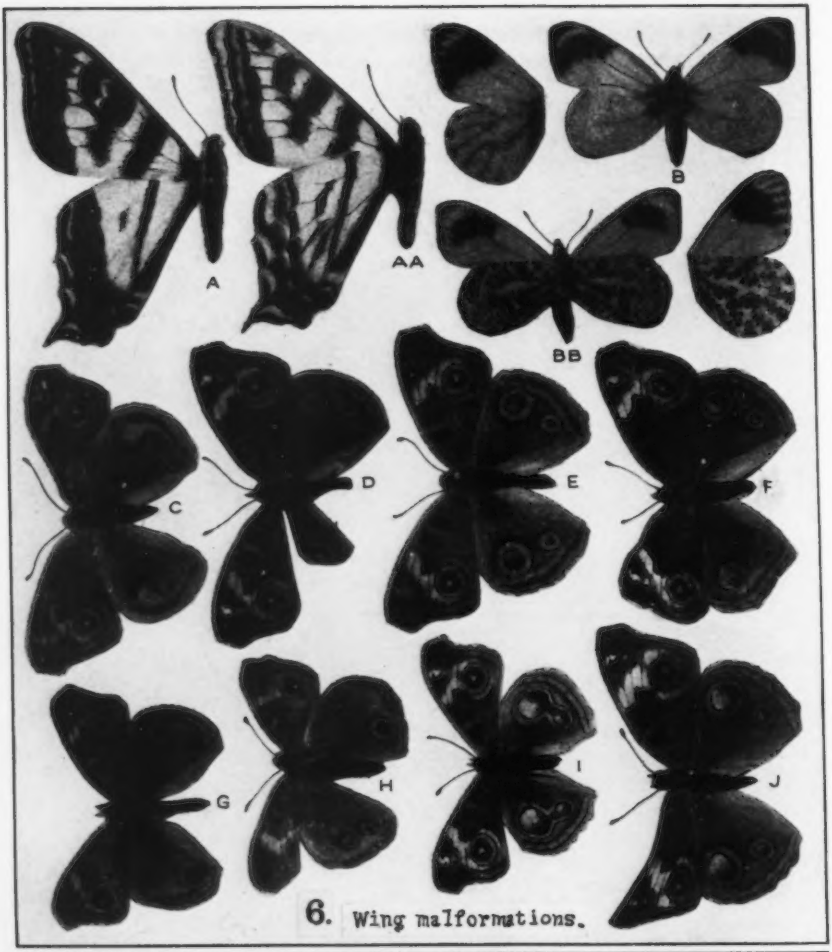
3. Dwarfs & Giants.

4. Rubbed specimens, etc.



5. Venation malformations.

UNNAMABLE BUTTERFLIES.—GUNDER.



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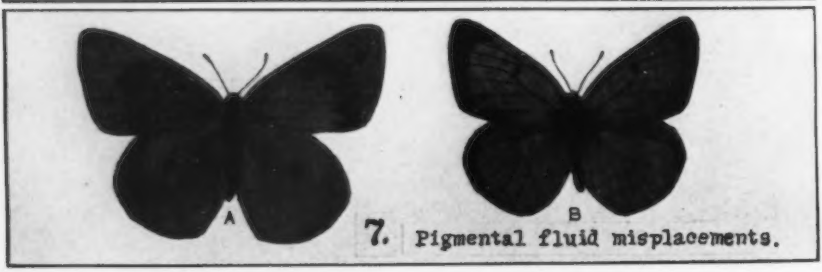
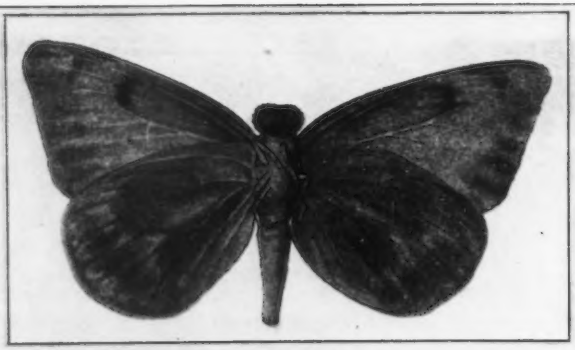
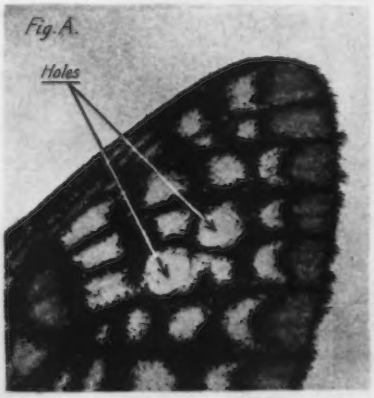


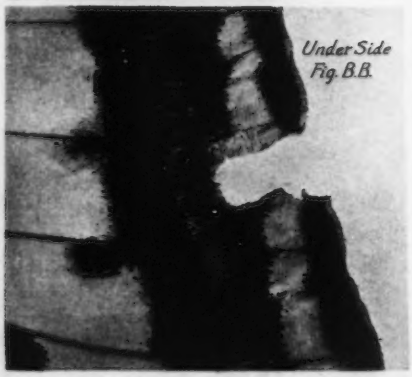
7. Pigmental fluid misplacements.



8. Monstrosities.

9. Fungus.





10. Parasitic wing punctures.

ENTOMOLOGICAL NEWS

VOL. XXXIX JULY, 1928 No. 7

Unnamable Butterflies (Lepid.: Rhopalocera).

By J. D. GUNDER, Pasadena, California.

(Plates VII-X).

Unnamable butterflies are those sorts of Lepidoptera which are popularly termed hermaphrodites, freaks, sports, deforms, malforms, aberrations (1), monstrosities, etc. Such specimens have no right to specific names and if named, they fall into synonymy. I believe a consensus of opinion in this regard bears me out.

As a class, these "freaks of nature" are interesting to observe and it is the object of this article to illustrate several kinds. I cannot here go into a complete diagnosis of their unfortunate physical condition. In most cases the causes of their ailments are unknown. Our latest check lists still record some of these named "freaks" as good, but I believe all will be eventually culled out.

For convenience of illustration and division of text matter, I have separated such specimens into ten groups as follows:

1. HERMAPHRODITES (Individuals in which the characters of both sexes are combined) AND MOSAICS. Plate VII, Fig. 1A is not really a hermaphrodite like fig. 1B, for example, but is a bi-formed *Papilio glaucus* L. ♀, having the dark form female on the left and the light form female on the right; specimen in the Academy coll. at Philadelphia; a similar specimen is figured in color by W. H. Edwards on Papilio plate 5 in "Butterflies of North America". Fig. 1B; ♀, same species; male left, female right; in Strecker coll., Field Museum, Chicago, Illinois. Fig. 1C; ♂, same species; right secondary only male; also

(1) The word aberration or ab. means— *"A wandering deviation from what is right, natural; a mental (or physical) disorder"*. It is a very general term which easily covers all "unnamable butterflies". It should not be used in classification for designating a grade of specimens; it implies no biological rank. For further discussion and reference see Ent. News, Nov., 1927, pp. 265-6.

in Strecker coll. Fig. 1D; ♀, same species; wings showing a conglomerate mixture of both sexes; also in Strecker coll.

2. CHRYSALIS BURNS. Specimens showing a bleaching out or irregular fading of the pigmental colors over the wings. Such specimens are commonly found in all species and in both sexes. They are disease-scarred individuals which have probably recovered from, or "pulled through," some mild affliction developed during the chrysalis stage. Plate VII, fig. 2A (type) shows a *Danaus menippe* (Hbn.) which was named *pulchra* (synonym) by Herman Strecker. Figs. 2B and 2C also show two other "birth-marked" specimens in the same species.

3. DWARFS AND GIANTS. Plate VIII, fig. 3C illustrates a normal size *Cynthia cardui* L. while figs. A and B show the opposite extremes. The name *minor* (Ckll.) should be in the synonymy, as it is based on small size only with no design or color change. Mr. T. D. A. Cockerell writes me this type was taken by him in Colorado flying with typical-sized specimens. I doubt if his original example was as small as the one shown by fig. 3A which was taken on the Mojave Desert.

4. RUBBED, FADED, OR DEGREASED SPECIMENS and those changed by long exposure to cyanide, etc. Such specimens are often mistaken for something new and undoubtedly names have been applied on this score. The illustrated figure shows a rubbed example of *Zerene eurydice* (Bdv.) which was given to me by a prominent western butterfly dealer who swore it was "a good thing" and worthy of a varietal name.

5. VENATIONAL MALFORMATIONS. Individuals whose vein patterns vary from normal and in consequence cause a change in maculation. Plate VIII, fig. 5A (upper side) and fig. 5AA (under side) show a variant *Argynnis cybele* (Fab.) named *bartschi* by Wm. Reiff. Fig. 5B (upper side) and fig. 5BB (under side) also show an irregularly veined *Argynnis coronis* (Behr) named *baroni* by W. H. Edwards. Both names should be in the synonymy. By closely observing the under sides of these specimens, the unusual and distorted position of the major veins will be noticed.

6. WING MALFORMATIONS. Specimens having deformed

wings of irregular contour. Examples of these unfortunate lepidoptera are everywhere common and no particular reason or reasons can be assigned for their condition, though much has been written on the subject. Plate IX, figs. 6A and 6AA show a *Papilio rutulus* Luc. named *hospitonina* by LeCerf of Paris. Its "crumpled" wing margins are easily seen. Figs. 6B and 6BB illustrate the "cramped" margins and corresponding marginal design alteration of a *Anthocaris sara reakirtii* Edw., which is figured by Comstock in his "Butterflies of California", plate 11, fig. 18. It is, fortunately, unnamed, though termed an aberration. Figs. 6C D E F G H I and J show examples of *Junonia coenia* Hbn. These readily picture the effects of wing malformation.

7. Pigmental Misplacements. Two types of this rare phenomenon are known. Plate IX, fig. 7A shows a female *Eurymus philodice* (Godt.) in which the colors are much "run out of bounds" or "spilled open" through the wing scales. The colors of this example resemble a paint pot and I wish it could be illustrated in natural color to show its motley rainbow combination of red, lilac, yellow and brown shades. The specimen is in the Museum of Comparative Zoology at Cambridge, Massachusetts. Fig. 7B shows the type of *Eurymus philodice rothkei* (Reiff). It is a case where some of the black pigment has remained in the veins or permeated their structures. I do not believe such specimens have a classificatory value or the right to a specific name. The type is in my collection.

8. Monstrosities. Under this heading comes a number of real "freaks", such as extra wing specimens, those matured without scales and those having unusual or superfluous parts or organs. As a novelty, I illustrate a female *Ascia monuste* (L.) with its larval head attached (Plate X, fig. 8). The specimen is in the Academy collection at Philadelphia and was taken in flight in Florida.

9. Fungus-affected Specimens. I am told that fungus growths are not uncommon in papered specimens which have been subjected to dampness. This is the only example I have noticed, however. The illustration (Plate X, fig. 9) shows such a

growth at the base of the eyes on the head of a *Papilio philenor* L. The growth is yellow in color. Can some one supply me with more information upon the subject of fungus on insects or direct me to articles on the subject?

10. WING PUNCTURES. Plate X, fig. 10A shows two holes through the wing of a *Euphydryas phaeton* (Dru.). Under a microscope these show evidence of healing. Can this be possible? Note the bending of the vein between the two punctures. This specimen was kindly sent to me by Mr. E. L. Bell of Flushing, New York. Plate X, fig. 10B (upper side) and fig. 10BB (under side) show greatly magnified photographs of a puncture near the outer margin on the wing of a *Papilio rutulus* Luc. The hole has been accidently torn open and enlarged to the outer margin by the butterfly itself prior to capture. The wings being folded during the chrysalis stage, it is evident that the incision did not penetrate through to the under folds, but left its mark as seen by the two black spots inward from the puncture.

[Without pretending to furnish a bibliography for Mr. Gunder's article, we may direct those interested to Morgan and Bridges' paper on "The Origin of Gynandromorphs" in Publication No. 278, Carnegie Institute of Washington, 1919, 122pp., 4 pls., 70 text-figs.; P. Cappe de Baillon's recent "Recherches sur la Tetratologie des Insectes", Paris, 1927; and H. A. Hagen's "On Some Insect Deformities" (Memoirs, Mus. Comp. Zool. Harv. Coll., ii, no. 9, 23pp., 1 pl., 1876). In this last Dr. Hagen brings together from the literature and his own observations a number of cases of "Perfect Insects with the Larval Head" in 12 species of Lepidoptera, 3 of Coleoptera and 1 of Diptera. I have examined the abnormal specimen of *Ascia* (or *Pieris*) *monuste* at the Academy of Natural Sciences of Philadelphia figured here by Mr. Gunder. A small, narrow strip of each imaginal compound eye shows behind each side of the larval head-covering. The latter is slightly split along the two sutures which bound the adfrontal plates laterally. The specimen, a dark female, was one of a lot of this color form received in paper envelopes by Mr. R. C. Williams, Jr., from the collector, and had not attracted attention from anyone until after it was pinned and spread.—EDITOR.]

Some Observations on the Behavior of Cerceris architis Mickel (Hym.: Philanthidae).

By C. E. Abbott.

In the summer of 1926, having nothing better to do than build up deficient red blood cells, I was in the habit of frequenting a field east of Elgin (Illinois) to bask in the sun. I discovered several burrows in the clay bank at the top of an abandoned sand pit. Part of the time these burrows were inhabited by busy little black-and-yellow wasps about half an inch in length. For many hours each day the wasps labored irregularly at their excavations.

The opening of each nest was nearly circular and about one centimeter in diameter. Into this the owner plunged, only to reappear a little later, abdomen foremost, behind a heap of loose earth. This kind of digging continued until the opening of the nest was quite hidden. Then the insect appeared, head foremost, from below; the debris was scattered around the opening in the form of a low crater. Of course the nest that opened on a vertical surface did not have this accumulation, which in some cases amounted to a teaspoonful of loose soil. Occasionally a wasp enlarged the door of her burrow by dislodging bits of earth with her jaws.

Often the wasps remained in the nests for hours with their faces in the doorways. This was especially the case on dull days, at which time the only reaction the insects gave was brought about by my sudden appearance or the intrusion of other insects. In the first case each wasp dropped out of sight into its nest, only to cautiously reappear when nothing more occurred to cause alarm. Toward too curious insects they behaved differently; rushing out, they violently drove these away.

Aided by grass stems and plaster of Paris, I was able to trace the extent of some of these burrows. In consequence of roots and stones, they were somewhat tortuous; all tended to incline to one side, so that the whole was curved like a scimiter. There was a surprising uniformity of width throughout the length of each burrow. Excepting the closed end,

where for two or three centimeters its width was fifteen millimeters, the average tunnel had a diameter of one centimeter.

In the terminal chamber, mixed with much loose earth, there were from three to seven weevils. In some nests the beetles were reduced to a few dry fragments. More often there were still slight evidences of life; twitching of the tarsi and movements of the head which ceased after twenty-four hours. The beetles stored by the wasps proved to be *Curculio nasicus* Say. They were about half an inch in length and of a light brown or buff color. They were remarkable for a proboscis nearly as long as the remaining parts of the body.

Each wasp, returned at irregular intervals with a weevil clasped beneath its body. At the door of its nest the wasp dropped the beetle, entered the burrow, and seizing the weevil, dragged it in.

I had the rare good fortune to see one of these wasps attack its prey. A living *Cerceris* and the beetle it had captured were put into a vial. Seizing the weevil by the left prothoracic leg, the wasp tried to drag it through the stoppered end of the bottle. Failing in this, she grasped her prey dorsally, taking its proboscis in her jaws; she then curved her abdomen beneath it and inserted her sting at the ventral juncture of the thorax and abdomen.

The departing wasps circled about their nests before taking off. When the position of objects in the vicinity of a nest were changed the returning wasp was unable to find her burrow.

In conclusion, I wish to thank Dr. S. A. Rohwer and his colleagues for the identification of the specimens.

To Authors of Entomological Papers.

EDITOR, ENTOMOLOGICAL NEWS: I herewith kindly ask you to inform your readers that I request those interested in having their entomological works noticed in the Russian entomological literature to forward their papers to me for the aforesaid purpose. V. YAKHONTOV, Manager of Entomological Department of Agricultural Experiment Station, Old Boukhara, Shiraboudin, S. S. S. R. (Russia).

Descriptions of New Species of North American Hydnocerinae (Col.: Cleridae).

By A. B. Wolcott, Field Museum of Natural History, Chicago, Illinois.

Hydnocera mira sp. nov.

Black, feebly shining; elytra piceous, basal third (suture excepted) red; antennae, mouth (mandibles piceous), palpi, front legs (outer edge of femora with an elongate piceous maculation), base and apex of middle femora, base of posterior femora, apex of middle and posterior tibiae, and tarsi pale testaceous; the tarsi somewhat infuscate.

Head, including the prominent eyes, slightly wider than the pronotum, rather coarsely and closely punctate; front with a large rounded impression on each side; pubescence sparse, long, erect, pale. Antennae short, stout, only slightly longer than the head. Pronotum slightly wider than long; apical constriction very feeble; sides abruptly strongly dilated; behind the dilation parallel to base; subapical transverse impressed line deep at flanks, feeble on disk; basal transverse line entire, distinct; lateral foveae large, not deeply impressed; punctuation same as that of head, with a few transverse regulae on disk and at sides; pubescence sparse, long, erect, pale. Scutellum densely clothed with white pubescence.

Elytra distinctly wider than the head, depressed, length slightly more than twice the width at base; sides parallel; apices obtusely rounded, not serrate, merely irregular in outline, narrowly dehiscent at suture; surface rather coarsely, closely punctate throughout; pubescence rather sparse, short, semi-recumbent, grayish white; color piceous, rufo-piceous at apex; basal third (suture broadly piceous) red, the posterior margin of the red area irregularly oblique from the lateral margin of the elytra to the piceous suture. Body beneath and abdomen shining, sparsely pubescent. Abdomen distinctly longer than the elytra. Legs rather densely clothed with long, erect, pale hairs. Length 5.7 mm.

One specimen: Sand Hills, Nebraska. July. *Type* (female) No. 942, in my collection.

This species is most closely allied to *wickhami* Wolc., from which it may be easily distinguished by the total absence of the post-median elytral fascia which is formed of silvery white hairs and which is so conspicuous in that species. Other differences that may be mentioned (aside from color) are the shorter

antennae, less strongly constricted prothorax, the lateral dilations of which are more prominent, with the sides posteriorly straight to base, and the absence of a nearly smooth discal area.

Hydnocera puritana sp. nov.

Robust, depressed, moderately pubescent, feebly shining, aeneous; antennae, mouth and palpi dull testaceous; anterior and middle tibiae and all tarsi piceo-testaceous.

Head, including the not very prominent eyes, scarcely wider than the greatest width of pronotum; front rather feebly biimpressed, moderately coarsely, occiput more closely, very feebly, finely rugulose. Antennae stout, slightly longer than the head. Pronotum nearly one-fourth wider than long (L:W: :48:60); sides rather strongly constricted near apex, moderately dilated at middle, parallel at base; lateral foveae small, deeply impressed; subapical and basal transverse impressed lines straight, deep; surface moderately coarsely, densely punctate, rugulose at apex and flanks.

Elytra distinctly wider than the head, twice as long as wide at base, feebly convex, slightly shorter than the abdomen; sides straight, very nearly parallel; apices separately obtusely rounded, very feebly serrate; humeri prominent; surface moderately coarsely, not closely punctate, in apical two-fifths densely scabrous; pubescence short, sparse, semi-erect, gray, more conspicuous in apical two-fifths, intermixed with sparse, erect, long, black hairs. Metasternum sparsely, finely rugulose. Abdomen rather coarsely, moderately sparsely, irregularly rugoso-punctate, the terminal segments more sparsely punctate; clothed with dense, long, white and sparse, black hairs. Legs sparsely clothed with long, erect, dark hairs. Length 6.2 mm.

One specimen: Boston, Massachusetts. June (Liebeck). *Type* (female) No. 654, in my collection.

Also allied to *wickhami* Wolc., and like *mira* distinguished by lacking the post-median fascia of silvery white hairs. In *puritana* the antennae are shorter, the humeri more prominent, the body above feebly shining, the prothorax is of a different form, with its transverse impressed lines entire, and the scutellum is nude, in all of these characters it differs from *wickhami*.

Hydnocera cuneiformis sp. nov.

Moderately elongate, rather depressed, shining, moderately sparsely pubescent, black; head and thorax faintly cupreo-

aeneous; antennae, mouth parts and elytra pale yellow, the last with piceous markings; legs pale yellowish red.

Head very finely and very sparsely punctate, rather densely clothed with depressed white pubescence, with a few longer erect white hairs intermixed; front with a crescentiform impression between the eyes. Pronotum nearly one-fourth wider than long (L:W: :29:37), nearly one-fourth narrower than the head across the eyes; surface finely rugulose; lateral dilation not very prominent; lateral foveae large and deep; subapical and basal transverse impressed lines deep and distinct; pubescence very sparse but with the long, erect, white hairs more conspicuous than on head. Scutellum triangular, black, the apex acute.

Elytra across the humeri very broad, equal in width to the head; sides straight, strongly convergent from humeri to apices, the latter very obtusely, separately rounded and distantly but not very strongly serrate; suture narrowly dehiscent in apical third; each elytron with a large, somewhat rounded impression at apical sixth, behind which the apices are very feebly tumid; flanks, apical and sutural margin in apical third strongly carinate; surface rather finely, very sparsely punctate, almost seriate, posterior to the subapical impressions more coarsely and closely punctate; pubescence very sparse, semierect, white; color pale yellow; at apical two-fifths a common, irregular, piceous maculation, which is formed by the apices and suture being broadly piceous, with a transverse extension of the same color just before the subapical impression, the maculation anterior to this confined to the suture and strongly attenuate anteriorly, reaching posterior margin of middle fifth of elytra; the dorsal surface of lateral carina piceous throughout its length. Legs rather sparsely clothed with moderately long, white hairs. Length 3.5 mm.

One specimen: Phoenix, Arizona. (Liebeck). *Type* (female) No. 1170, in my collection.

Different in form from any species yet described in our fauna, but bearing, in this respect, a good deal of resemblance to the Central American *H. guatemalae* Gorh., but there the similarity ceases, as the two species differ in nearly every detail of structure. The new species is best placed in proximity to *omogera* Horn, from which it may readily be distinguished by its much longer elytra, the sides of which are absolutely straight, the lateral margins not at all serrate, and the entire absence of a fascia of pubescence at apical third; the head is more sparsely punctate; the dilations of the pronotum are

stronger; the elytra are much less coarsely and less deeply punctate, and the apices are more broadly obtusely rounded and much less strongly serrate.

In the specimen at hand the abdomen is a trifle shorter than the elytra, but it is quite evidently shrunken and contracted and consequently the elytra are, in all probability, normally a little shorter than the abdomen.

Hydnocera blanchardi sp. nov.

Dark blue, shining, thorax with slight aeneous luster; front and middle tibiae, hind tibiae at apex and base, all tarsi, antennae (club excepted), palpi, mandibles and labrum pale testaceous; antennal club pale fuscous.

Head, including the moderately prominent eyes, slightly wider than the pronotum, moderately finely but very densely punctate; front with a feeble crescentric impression; pubescence very short, sparse and recumbent, silvery white, with no intermixture of long dark or light hairs. Antennae short, stout, slightly longer than the head. Pronotum slightly wider than long, apical constriction moderately strong; sides broadly, rather strongly dilated, behind dilation parallel to base; subapical transverse impressed line deep and broad; basal impressed line deep; basal margin reflexed; lateral foveae feeble; sides with same punctuation as that of head, a small discal area devoid of punctures; pubescence short and recumbent whitish, intermixed with longer sparse, erect light brown hairs.

Elytra slightly wider than the head, depressed, about twice as long as the width across the humeri; sides very feebly narrowing toward apices, the latter separately rounded and rather strongly serrate; broadly dehiscent at suture; surface moderately coarsely, densely punctate, the apical two-fifths scabrous; pubescence same as that of pronotum but becoming a little more dense toward the apices, and with a feebly indicated post-median fascia composed of whitish pubescence. Body beneath and legs rather sparsely pubescent. Abdomen very slightly longer than the elytra. Length 3.2 mm.

One specimen: New Mexico, (Leng). *Type* in the collection of the late Frederick Blanchard to whose memory this fine species is dedicated.

Greatly resembles *H. fuchsi* Schffr., but in *blanchardi* the elytra are more densely punctate in more than basal half, while the apical two-fifths are scabrous (basal half densely-cribrate in *fuchsi)*, the transverse fascia is post-median (median in *fuchsi)*, the sides are less truly parallel, the apices are more strongly serrate and leave a portion of the abdomen exposed. The head in *blanchardi* is clothed with short, sparse, recumbent pubescence, with no intermixture of long dark hairs, these

long, erect, dark hairs being very conspicuous in *fuchsi.* The coloration also is somewhat different.

Isohydnocera mima sp. nov.

Form of *I. tabida* Lec., but with sides of thorax much more strongly dilated. Aeneous-black, feebly shining; mouth, palpi, antennae (five apical segments, piceous) and anterior and middle legs pale yellowish; posterior legs black, with basal half of femora, knees and tarsi pale yellow; pubescence moderately long, erect and recumbent, rather dense, that of elytra conspicuously dense, white.

Head large and broad; eyes prominent; front feebly biimpressed, finely and sparsely punctate, becoming very finely rugulose posteriorly. Pronotum about one-fourth longer than wide across dilations (L:W: :43:34); sides behind the dilations straight and feebly convergent to base; surface finely rugose, with large, feebly impressed punctures at the sides and in a little more than basal half; lateral foveae small, feebly impressed.

Elytra at base subequal in width to the head; sides feebly convergent to apex; apices obtusely, separately rounded, strongly serrate, tumid, slightly dehiscent at suture; surface coarsely, deeply and densely punctate, the tumid apices shining and very sparsely punctate. Underside shining, sparsely pubescent and finely punctate; abdomen one-half longer than the elytra, finely and sparsely rugulose. Length 5- 5.5 mm.

Two specimens: Arizona. *Type* (female) No. 1228, in my collection; *cotype* (female) in the collection of Mr. Chas. Liebeck, to whom I am indebted for the type specimen.

The new species appears to be very near *I. nigrina* Schffr., but differs from that, as described, by having the elytral apices strongly serrate and the legs much paler, the legs in *nigrina* being in great part black. The pubescence is also more dense than is implied in the description of *nigrina,* for it seems certain that Mr. Schaeffer would have mentioned the conspicuous and dense pubescence of the elytra, if it were present in his species.

Isohydnocera liebecki sp. nov.

Form similar to *I. curtipennis* Newm., but with much more elongate elytra and differently formed thorax. Black, moderately shining, sparsely pubescent; elytra dark piceous, humeri and apical portions rufo-piceous; palpi, antennae (segments 7-11 piceous) and legs pale yellowish, hind tibiae (base excepted) and hind femora near apex narrowly black.

Head only slightly wider than pronotum at widest part; front feebly impressed between the eyes, finely and very densely rugose, posteriorly more finely and sparsely rugose. Pronotum one-fourth longer than wide (L:W: :35:28); sides dilated, a little more strongly than in *curtipennis* but not constricted behind the dilation, straight and rather strongly convergent from apex of dilation to base of pronotum; surface coarsely alutaceous, with coarse, very sparse, feebly impressed punctures.

Elytra very elongate, at base as wide as the head; sides parallel to near the apex, thence feebly narrowing to the obtuse, non-serrate apices, the latter slightly dehiscent at suture; surface rather coarsely, deeply and densely punctate, the punctures largely confluent. Underside shining; abdomen but very slightly longer than the elytra. Length 5 mm.

Two specimens: Anglesea, New Jersey. June 20 and July 4 (Liebeck). *Type* No. 1229, in my collection; *cotype* in the collection of Mr. Chas. Liebeck, to whom I am indebted for the type specimen and to whom it gives me great pleasure to dedicate this very distinct species, which, it is only just to say, was recognized by Mr. Liebeck as being undescribed.

Closest allied to *I. curtipennis*, from which it may be readily distinguished by the very elongate elytra, which are more elongate than even in *I. tabida*, but much less dehiscent at the suture, the sides of the elytra more parallel and but feebly attenuate toward the apices, the latter are not serrate, while in *curtipennis* they are strongly serrate. The form of the pronotum, and the but slightly abbreviated elytra, which nearly cover the abdomen, are also distinctive characters.

On the Use of the Word "Chitinized".

By G. F. Ferris, and J. C. Chamberlin, Stanford University, California.

It would seem reasonable to suppose that such a fundamental subject as that of the nature of the non-cellular integument of insects should by this time be entirely understood and free from confusion. Yet apparently this is not the case. Let us consider some of the various statements concerning the matter.

Packard [1] presents the following. "If we allow an insect to soak for a long time in acids, or boil it in liquid potassa or

[1] Packard, A. S. Text-Book of Entomology, p. 29.

caustic potash, the integument is not affected. The muscles and the other soft parts are dissolved, leaving the cuticle clear and transparent. This insolubility of the cuticle is due to the presence of chitin, the insoluble residue left after such treatment."

And he quotes from Miall and Denny, "The Cockroach". "Chitin forms less than one-half by weight of the integument, but it is so coherent and uniformly distributed that when isolated by chemical reagents, and even when cautiously calcined, it retains its original organized form. The color which it frequently exhibits is not due to any essential ingredient; it may be diminished or even destroyed by various bleaching processes."

From all this we may conclude that the fundamental base of the non-cellular body wall is chitin and that this chitin is the carrier of other substances—such as pigments—that with it make up the cuticle.

Yet if we turn to one of the very recent text-books [2] we find a directly contradictory statement. "The well known firmness of the larger part of the cuticle of adult insects is due to the presence in it of a substance which is termed *chitin* . . . When freshly formed, the cuticula is flexible and elastic, and certain portions of it, as at the nodes of the body and of the appendages, remain so . . . we may speak therefore of chitinized cuticula and non-chitinized cuticula."

It is evident from this quotation that we have here a point of view which assumes that the base of the non-cellular body wall is not chitin at all, but some other substance in which the chitin is deposited. What that other substance may be is nowhere stated, nor apparently does anyone know.

The same point of view is even more definitely expressed in another text [3] where we find this statement. "For the most part, however, the cuticle forms a hard, inelastic exoskeleton which is due to its becoming permeated with a substance termed *chitin*."

Tillyard [4] says merely that "It (the exoskeleton) is com-

[2] Comstock, J. H. An Introduction to Entomology, p. 30.
[3] Imms, A. D. A General Text-Book of Entomology, pp. 6-7.

posed of *chitin.*" He speaks further of "strongly chitinized" areas and of "soft, membranous chitin." It is evident that his point of view is in accord with that of Packard.

Now it is a common experience with anyone who works with insects by the methods now used by most of the students of the small forms such as the Coccidae, that even a rather short period of boiling in concentrated alkalis will profoundly alter these "chitinized" portions of the body wall, removing from them their color and reducing them to a flexible and membranous condition. In fact attention is called to this very circumstance by most of the authors from whom we have quoted. We have then a very curious circumstance. This chitin which *permeates* some other substance that forms the cuticula and which gives to it hardness is the first thing to disappear although by its very definition it should be the last!

As a matter of fact, by the very definition of it, chitin is the basic substance of which the non-cellular body wall is composed. The *entire body wall,* membranous and hard, is basically composed of chitin and this chitin serves as the carrier in which other substances are deposited. The body wall is not some other substance permeated with chitin, it is chitin permeated with other substances. This view is in accord with that of Packard and of Tillyard and opposed to the view of Comstock and Imms.

It is entirely *improper* then to speak of "chitinized" and "unchitinized" areas. There are no such things as unchitinized areas except pores and similar apertures and the harder portions are areas—possibly, it is true, of thicker chitin—in which there has been formed a deposit of other substances which cause the hardening and pigmentation. This is simply in accord with the observed facts. It is in accord with certain experiments made by the second author of this paper, in which it was found—as has been found by others—that even after the most rigorous treatment with acids and alkalis the form of the insect still remains in a soft and flexible condition and that the substance of this form is what is commonly considered to be chitin.

[4] Tillyard, R. J. Insects of Australia and New Zealand, p. 9.

The other substances which are borne by the chitinous base and which are removed by the action of reagents are apparently of a proteinaceous nature. The chitin itself is pure white and transparent.

All of this has a certain practical bearing. For one thing it has to do with the matter of the action of stains. The stains that are at present being used extensively in the study of such small insects as the Coccidae—magenta and acid fuchsin—are not in any sense chitin stains. Actually they are specific stains for at least a part of the substances which are contained in the chitin and which are of a proteinaceous nature. As a matter of fact, a true chitin stain is exactly what is not wanted for such work, for such a stain would give little or no differentiation, while these other stains select for their action those areas which are commonly considered as "chitinized."

In the preparation of such material for staining the treatment must be such that these proteins are not affected by it. Too prolonged treatment with alkalis or too intense heat will remove or alter them in such a way that the stains are not effective.

It would be well if our terminology took cognizance of the facts in connection with this matter and were brought more into accord with them. It is evidently quite incorrect to speak of chitinized and unchitinized areas. It is not entirely correct to speak of areas of stronger or weaker chitinization when what we actually mean are areas in which these other substances are or are not deposited without regard to the amount of chitin that may be present.

We might very logically extend the use of the root which appears in the word "sclerite." This word alone is hardly sufficient to meet all our needs and we could speak of "sclerotic areas" or of "sclerotized areas". Such usage should be much more satisfactory than that which is at present followed, for it avoids the obvious contradiction which appears in the present practice and the confusion of thinking that is at the root of this contradiction.

A New Endomychid from Florida[1] (Coleop.).

L. B. WALTON, Kenyon College, Gambier, Ohio.

An Endomychid belonging to the genus *Stenotarsus* quite distinct however from our common *S. hispidus* (Herbst) so widely distributed over the eastern part of the United States, was recently forwarded me for identification by Mr. W. S. Blatchley, of Indianapolis, Indiana. The single specimen collected by Mr. Blatchley was obtained on the west coast of Florida at Dunedin, April 10, 1926, in beating red cedar (Juniper).

The species is easily distinguished from *S. hispidus* by having the seven terminal segments of the antennae black, by the uniformly testaceous color of the dorsal side, and by the black areas covering the underside of the metathorax and abdomen. Casey (1916) described *S. solidus* from North Carolina as a new species stating that the "ninth antennal joint (was) distinctly longer than the tenth and not subequal in length as in *hispidus*". All of the many specimens of *S. hispidus* which I have seen however, have the ninth segment of the antennae slightly longer than the tenth segment. Inasmuch as the other characters noted have on the basis of the description only a relatively slight comparative value, the form scarcely merits being retained even as a variety.

The genus *Stenotarsus* is an extremely large one numbering some one hundred and fifty species confined almost entirely to the tropical regions, only a few being found in the temperate zones. The punctuation of the elytra may be utilized to separate the forms into at least three fairly well defined groups, commencing with the well defined striate forms and ending with the irregularly punctuate forms found in North and South America. If we assume with Tillyard that the arrangement of the punctures in the form of striae represents a more primitive condition, so far as the Coleoptera are concerned, than the irregular arrangement, the trend of migration in the group is clearly indicated.

The two species found within the limits of the United States and Canada may be easily separated by the following characters.

[1] Contributions from the Samuel Mather Science Hall. Biology No. 32.

Table of Species.

Antennae with six distal segments black; disk of each elytron black with a narrow pale yellow border sometimes obsolete along the suture; underside uniformly pale yellow.
S. hispidus.

Antennae with seven distal segments black; dorsal surface of the body uniformly pale yellow except the eyes; abdomen and metathorax beneath with large black central area.
S. blatchleyi.

Stenotarsus blatchleyi n. sp.

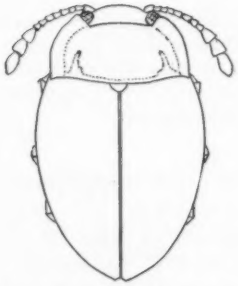


Fig. 1. *Stenotarsus blatchleyi* (x 10), from Dunedin, west cost of Florida.

Uniformly light yellow in color with the exception of the seven distal segments of the antennae, the eyes, and a central area covering the greater part of the underside of the abdomen and the metathorax, black; clothed with long yellowish hairs.

Form elongately oval, the elytra gradually narrowed behind so that an acuminate appearance is presented; legs comparatively short; antennae extending slightly beyond the posterior margin of the pro-

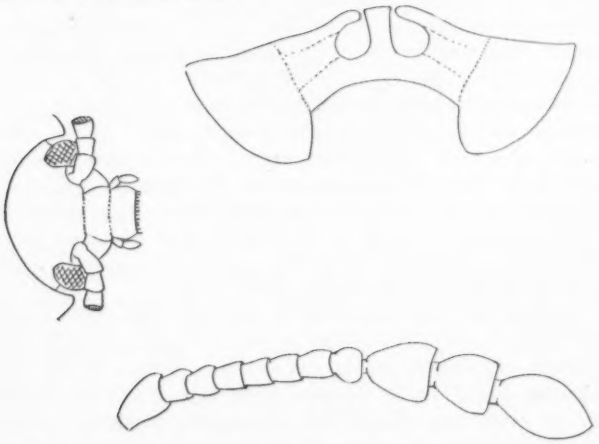


Fig. 2. *Stenotarsus blatchleyi.* (A) Underside of prothorax (x 30). (B) Antenna (right) (x 40). (C) Head (x 15).

notum, the first segment somewhat elongate, second globose, third to seventh segments slightly increasing in length, the sixth and seventh segments distinctly longer than broad, the eighth segment globose, and the ninth, tenth and eleventh segments forming a club the length of which is approximately equal to the length of segments three to eight inclusive; distal segment elongately oval and acuminate at tip.

Pronotum transverse with posterior angles slightly acute, decidedly narrowed anteriorly, central area convex, marginal lines distinct, longitudinal sulci scarcely attaining the middle, slightly convergent anteriorly, fine basal sulcus almost in contact with the posterior margin.

Scutellum punctuate, broadly triangular; elytra with prominent umbones, entire surface finely and irregularly punctuate; abdomen with first segment equal in length to the three succeeding segments, the fifth longer than the fourth segment, and the narrow sixth longer than the fifth segment.

Length, 4 mm. Diameter, 2.6 mm.

Type in collection of W. S. Blatchley. Taken at Dunedin, Florida.

I take much pleasure in dedicating this species to Mr. Blatchley who has done so much efficient work in promoting the cause of systematic entomology. It is closely related to *S. latipes* Arrow (1920) erroneously identified by Gorham in the Biologia Centrali-Americana (1899) as *S. angustulus* Gerstaecker, as pointed out by Arrow. It is to be distinguished however from that species in possessing four basal segments of the antennae which are pale yellow, in its smaller size, and in having the antennae decidedly less than half the length of the body, a characteristic however which differs in the sexes of many species of *Stenotarsus*. In *S. latipes* the two basal segments of the antennae are pale yellow, the third and fourth are pale brown, and the seven distal segments black, while the length of the individual is noted as 5.5 mm. instead of 4 mm. as in *S. blatchleyi*. A careful comparison of the two species would undoubtedly show other distinct differences.

Continued careful collecting in Florida will undoubtedly yield many more subtropical species of insects particularly among the minute forms so often overlooked by the average individual interested in entomological pursuits. We should thus be quite appreciative of the results obtained by Mr. Blatchley in helping to demonstrate the value of keen observation in connection with the fauna and flora of Florida.

Bifurcation of Antenna in Balaninus (Coleop.: Curculionidae).

By ORLANDO PARK, Whitman Laboratory, University of Chicago.

The abnormal modification of antennae has been noted previously in the Coleoptera by a number of observers, by Jayne ('80), Riley ('91), Schwarz ('90), Scudder ('91), and by Cockayne ('25) among others. Bateson ('94) lists many cases, more or less complex, originally described by G. Kraatz, Albert Mocquerys and a host of other European workers.

As a preface to future work, I wish to record another malformed antenna among Coleoptera. The specimen is a male *Balaninus rectus* Say, normal save for a deformed left antenna. As illustrated in the accompanying figure, the seventh segment of the funicle is bifurcated. Each distal, articulating surface of this swollen segment bears a three-segmented club; one of these is normal with reference to the club of the right antenna, and is obviously the true continuation of the funicle. The other club is smaller in size, partially rotated and apparently is the duplicating member. Nothing definite may be said on the symmetry involved as the normal club is a bilaterally symmetrical structure, in its major details at least, rendering any interpretation doubtful (Bateson l. c. p. 513, 548).

Abnormal antenna of *Balaninus rectus* Say.

Such a duplication of the distal end of an appendage is probably due to a chance injury at a more proximal point (Cockayne l. c., after Bateson), possibly a longitudinal incision of the structure at an earlier stage of development. Cockayne (l. c.) lists a case in *Photuris trilineata* Say, bearing a certain similarity to the one described, and the results obtained by Shelford ('15) on the labrum of *Cicindela* may indicate a possible explanation. Such malformations, in the broad sense, are not uncommon among the Caraboid, Scarabaeoid, and Cerambycoid stocks but seem to be unusually scarce among the

Rhynchophora, as has been noted by Bateson. The latter lists but two cases of simple antennal duplication among weevils, (l. c. p. 550).

The specimen was taken in the lower beach drift of Lake Michigan, alive, near Tremont, Indiana (August 29th, 1925) and is now in the collection of the writer.

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Fourth International Congress of Entomology.

Dr. O. A. Johannsen, American Executive Secretary of the Congress, has sent out the following preliminary program of the meetings to be held at the Baker Laboratory of Chemistry, Cornell University, Ithaca, New York, except when otherwise stated.

Four general sessions will be held, at which papers of broad interest will be presented by the leading entomologists of the world. The afternoons will be devoted to meetings of the following sections and subsections: 1. Taxonomy, Distribution and Nomenclature. 2. Morphology, Embryology and Physiology. 3. Ecology. 4. Medical and Veterinary Entomology. 5. Genetics. 6. Apiculture. 7. Economic Entomology: *a*. Fruit Insects; *b*. Cereal- and Truck-Crop Insects; *c*. Cotton Insects; *d*. Insecticides and Appliances; *e*. Forest Entomology.

Saturday and Sunday, August 11 and 12, Willard Straight Hall, headquarters of the Congress, will be open for registration and information.

Sunday, August 12, opportunities will be available for field excursions to some of the interesting collecting grounds in

the vicinity of Ithaca, such as the sphagnum bogs at McLean. 8:00 p. m., informal gathering at Willard Straight Hall.

Monday, August 13, 10:00 a. m., first general session. Address of welcome by Dr. Livingston Farrand, President of Cornell University. Opening address of Congress by President L. O. Howard, followed by a general session. 2:00 p. m., section meetings. 8:00 p. m., smoker.

Tuesday, August 14, 9:00 a. m., general session. 2:00 p. m., section meetings. 4:30 p. m., picnic supper at Enfield Falls.

Wednesday, August 15. The Wednesday meetings will be held at the New York State Agricultural Experiment Station, Geneva, New York. (Geneva is forty miles from Ithaca by train or automobile.) 10:00 a. m., inspection of the Experiment Station. 3:00 p. m., section meetings.

Thursday, August 16, 9:00 a. m., general session. 2:00 p. m., section meetings.

Friday, August 17, 9:00 a. m., section meetings. 2:00 p. m., general session and business meeting. 7:00 p. m., banquet, charge $2.00.

Saturday, August 18, 9:00 a. m., informal meeting of sections.

GENERAL INFORMATION. In Ithaca, at the headquarters of the Congress, rooms may be engaged at the university dormitories at from $2 to $2.50 a day for each person. Rooms in private houses may be obtained at $1 a day. Board is obtainable at cafeterias and restaurants on the campus, as well as at other places, for from 40 to 60 cents a meal. Suitable camping quarters are available on the campus for those who may wish to camp out. Tea will be served at Willard Straight Hall every afternoon between four and six o'clock. Motion-picture films of interest to biologists, theatricals, and other forms of entertainment are scheduled for those evenings not otherwise provided for in the foregoing program. Trips to near-by places of interest, and other forms of diversion, will be arranged for the entertainment of the women who may not be primarily interested in the entomological program.

EXCURSIONS: After the Congress the following excursions have been arranged:

Sunday, August 19, an excursion to Niagara Falls and return to Ithaca. Special round-trip rate, $7.40. Members who desire to go to Pittsburgh before proceeding to Washington may leave Niagara Falls for Buffalo and go thence by night train to Pittsburgh. This deviation from the plan will involve an additional cost for railway fares ranging from $7 to $10, depending on whether or not a sleeper is taken. The fare from Niagara Falls to Buffalo is 50 cents; from Buffalo to Pittsburgh, $9.20;

from Pittsburgh to Washington, about $10. Those who desire to omit Pittsburgh from their itinerary will return on Sunday from Niagara Falls to Ithaca.

Monday, August 20, by rail to Washington, D. C. Leave Ithaca 9 a. m. Arrive at Washington 10 p. m. Fare, $12.12.

Tuesday, August 21, to Friday, August 24, in Washington. United States National Museum; United States Bureau of Entomology; other points of interest. One afternoon at Plummer's Island.

Friday, August 24, p. m., by rail to Philadelphia. Arrive 6 p. m. Fare, $4.90.

Saturday, August 25, in Philadelphia. Academy of Natural Sciences; American Entomological Society.

Sunday, August 26, field excursion to the New Jersey Pine Barrens.

Monday, August 27, the Japanese Beetle Laboratory at Moorestown and Riverton. Afternoon—continue from Riverton via Trenton to New York. Arrive 6 p. m. Fare from Philadelphia to New York, $3.24.

Tuesday, August 28, to Boston by motor bus. Fare, $3 and above.

Wednesday, August 29, in Boston. Museum of Comparative Zoology; Boston Society of Natural History; the Corn-Borer Laboratory at Arlington.

Thursday, August 30, in Boston. Bussey Institution of Harvard University; Arnold Arboretum; the Gypsy Moth Laboratory at Melrose Highlands. To New York via steamship, fare $4 to $5 (stateroom $1 and above).

Friday, August 31, in New York. Brooklyn Museum; New York Zoological and Botanical Gardens.

The total cost of this excursion, including board, room and railway fares, need not exceed from $90 to $100. If either Pittsburgh or Boston (including Melrose Highlands) were omitted, the fares would be $10 less. In most cities rooms without bath may be obtained as low as from $2 to $3 a day. Board will average $1.50 and upward a day.

Indications are that this will be a record meeting. Nearly a hundred European entomologists have already signified their intention of coming, and many more are expected.

Return sailings to Europe on either English or Dutch lines, Saturday, September 1. Those omitting the excursion to Philadelphia or Boston may sail on August 25.

Inquiries regarding housing and local entertainment should be addressed to the chairman of the Committee on Local Entertainment, Dr. P. W. Claassen, Cornell University, Ithaca, New York.

New Synonymy (Lep.: Saturnidae).

CALLOSAMIA SECURIFERA Massen.

1873 *Samia securifera* Massen, in Massen & Weymer Beiträge zu der Schmetterlings Kunde, ff. 50, 51, Central America.

1908 *Callosamia angulifera* Walker, Var. *Carolina* Jones Ent. News, XIX, 231.

1909 *Callosamia carolina* Jones, Ent. News, XX, 49 pl. III, ♂ & ♀ pl. IV, Cocoons.

The figures in the *Beiträge* are rather crude, but easily recognized as the form described by Jones. In the illustration of the male, the discal marks on the primaries are much more conspicuous than in the type of *carolina,* but this a variable feature in the genus *Callosamia.* Jones, in his description of the male, says "discal mark on primaries, yellow and prominent, on secondaries absent or very faintly indicated." The type males in the collection of the Academy of Natural Sciences of Philadelphia, may be less conspicuously marked than the average; I have bred some male *prometheus* with large discal marks, some without any. I have also bred a female *prometheus,* without any discal marks on any wings (ab. ♀ *caeca* Ckll.).

The suffused color of the inferiors of the male on both upper and under surfaces is a good distinguishing character.

Massen in his short denomination of the species writes "probably the southern form of *angulifera,*" but I can see no reason why *securifera* should not have specific rank. The life history is not the same as *angulifera,* and as species go, it is as good as any other. Besides the ♂ type and ♀ allotype of *carolina* from South Carolina, we have 2 ♂ ♂ and 2 ♀ ♀ from Mobile, Alabama, collected by Mr. W. C. Dukes. They all match Massen's figures very well.

FRANK HAIMBACH, Acad. Nat. Sciences, Philadelphia.

Personals

Dr. Carlos E. Porter, of Santiago, Chile, editor of the *Revista Chilena de Historia Naturale,* has been elected president of the Entomological Society of Spain.

Prof. James S. Hine, of Ohio State University, and Dr. Annette F. Braun, of Cincinnati, have been elected President and Vice President respectively, of the Ohio Academy of Science. (*Science,* May 25, 1928.)

Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

The numbers **within brackets** [ ] refer to the journals, as numbered in the list of Periodicals and Serials published in the January and June numbers (or which may be secured from the publisher of Entomological News for 10c), in which the paper appeared. The number of, or annual **volume,** and in some cases the part, heft, &c. the latter **within** ( ) follows; then the pagination follows the **colon** :

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

☞*Note the change in the method of citing the bibliographical references, as explained above.*

Papers published in the Entomological News are not listed.

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SPECIAL NOTICES.—Betrem, J. G.—Monographie der Indo-Australischen Scoliiden (Acul.). Mit zoogeographischen betrachtungen. [Treubia] 9: Suppl., 1-388, ill. [This paper may prove of interest to American students of hymenoptera.]

Comments on the Odonata Recorded in "A List of the Insects of New York." (See the NEWS for April, p. 135.)

The 159 species of Odonata recorded from New York State in the long awaited "List of the Insects of New York", represent an imposing array of material and State records. For means of judging the completeness of this work, the following figures may be of significance:

Region	Authority	Date	No. Species
World	Muttkowski	1910	2,631*
North America	Muttkowski	1910	494*
New England States	Howe	1920	156
Michigan	Byers	1927	131
Indiana	Williamson	1917	125
Connecticut	Garman	1927	112

* Includes subspecies.

Of particular interest to me is the large number of southern species included, names such as *Agrion amatum, Lestes vigilax, Argia bipunctulata, Ladona deplanata, Libellula flavida, Libellula vibrans* and *Pachydiplax longipennis,* although not unrecorded from the north, are ones that we more naturally associate with the Dragonfly fauna of the south-eastern states.

There are several errors in the list that I would like to mention, more for the sake of the avoidance of confusion than in the spirit of fault finding. On the bottom of page 45, the first genus mentioned is that of *Calopteryx* Burmeister. The genus *Calopteryx* was judged, some eighteen years ago, by the Commission on Nomenclature of the International Zoological Congress to be a synonym of *Agrion* Fabricius. Hence the word *Agrion* should be subsituted for that of *Calopteryx* wherever the latter appears. Page 48, line 8 should read *E. vesperum* Calv. and not *E. hesperum* Calv. Likewise, page 51, the last line should read *A. tuberculifera* Wlk., not *A. tuberculata* Wlk. The genera on page 46 from line 12, to page 48, including *Anomalagrion* on page 49, have been included in the Damselfly family *Agrionidae,* I know of no modern list of Odonata that does not place these genera in a separate family, that of the *Cocagrionidae.* It is, therefore, my belief, that the words, Family *Cocnagrionidae* Kirby, should be added on page 46 following the genus *Hetaerina,* and preceding the genus *Lestes.*

Two other matters pertaining to this list of Odonata present themselves at this time. It was my privilege to work on the Odonata collections at Cornell University during the winter of 1926-27, after the list in question had been compiled. During the progress of this work I determined that the species listed on page 48, line 21, as *N. carlotta* Butler is in reality a synonym of *Nehalennia irene* Hagen. Also, that the species, *Gomphus cornutus* Tough, listed on page 50, line 14, a record based on a single specimen from the McLean Reservation, is a misidentification for *Gomphus furcifer* Hagen. *Gomphus cornutus,* as far as I know, occurs only in Michigan and Wisconsin.

C. Francis Byers, Dept of Biol., Univ. of Florida.

Leaf-Mining Insects. By James G. Needham, Stuart W. Frost, Beatrice H. Tothill. Baltimore: The Williams and Wilkins Company, 1928. Pp. 351. 91 figures. 3 plates. —— Under this title, the authors have brought together a wealth of general information on the subject of leaf-mining larvae in the four orders, Lepidoptera, Coleoptera, Diptera

and Hymenoptera. The first two chapters are of a general nature and deal with such topics as the leaf as a dwelling place, the types of leaf-mining larvae, the general tendencies in evolution of a form of body adapted to leaf-mining, the mines themselves, the origin of the leaf-mining habit and its intergradation with other habits, extent of the leaf-mining habit and preferred plant hosts. They contain such usable features as a classification of mines and the relation of mining operations to leaf structure, a table (p. 35) for separating the larvae of the four orders and general directions for collecting and rearing leaf-miners. The last topic could well have been somewhat enlarged upon in a book which contains so much of interest to the field worker.

Chapter III is devoted to the Lepidoptera in general and the succeeding eight chapters deal with those subdivisions of this order in which the leaf-mining habit has developed. The plan is to describe in general each group (egg, larva, pupa, adult), the character of the mining operations and point out the particular modifications and adaptations to the mining habit shown, followed by examples of representative members. The widespread development of the mining habit in the Lepidoptera is indicated by the proportion of the book given up to this order—140 pages out of a total of 280 pages of text matter.

The same plan is followed in the other three orders, Coleoptera (Chapter XII), Hymenoptera (Chapter XIII), Diptera (Chapter XIV). In these orders, tables and keys to species which should be of value to the worker are included.

The steps in the specialization of form for the leaf-mining habit, more particularly as shown by Lepidopterous larvae, where the extreme of modification is exhibited in the mouth-parts of the sap-feeders, the remarkable convergence in form in the mandibulate leaf-mining larvae, and adaptation of larval habits to the mining life, briefly outlined in the first chapter, furnish abundant material of interest to the general biologist and the student of evolution, and are ably presented by the authors in the general chapter on Lepidoptera (Chapter III) and in the general parts of the chapters devoted to the other three orders.

To the field worker, whether he be ecologist, amateur student of nature, plant pathologist or economic entomologist, those parts of the general chapters which deal with the individuality of mine, which enables recognition of a genus, or even of a species within it, and the general descriptions of mining habits under each group, will be of especial interest

and value. Some of the generalizations given under mining habits may require modification with increasing knowledge (*e. g.* in *Bucculatrix*). Again the facts scarcely warrant the distinction made (cf. pp. 19, 20) between the form of mines of the same general type in firm and soft leaves, as both forms may occur on the same leaf.

Valuable features of the book to the outdoors observer are the lists of leaf-mining insects and their hosts (Chapters XV and XVI). It seems to the reviewer that here it would have been advisable to append a note to the effect that the list includes those species of which there is a definite record of mining habit; the omission of many species (even where food plant is known) in genera of leaf-mining habits may cause confusion and misconception in the mind of the inexperienced worker to whom complete lists of species and bibliographical references are not available. *Epermenia* appears to be omitted from the list of leaf-mining Lepidoptera, and *Gracilaria alnivorella* and *G. purpuriella* are erroneously listed under *Scythris*.

The bibliography will be an invaluable aid to the student, and brings together, particularly in the Microlepidoptera, a great proportion of the papers dealing with the group.

It is unfortunately necessary, in a book whose conception and treatment have so much of merit and value, to point out some of the blemishes and errors. The tremendous number of typographical errors, especially in the scientific names throughout text and lists, is much to be regretted; it is impossible to enumerate these. The omission of words and the use of a word with opposite meaning to the one intended occur in several instances, but the context will generally indicate the correction. In the bibliography, obvious errors in transcribing references appear. Figure 2, purporting to be an illustration of *Lithocolletis hamadryadella,* does not represent that species, which is correctly delineated by figure 43, but more probably represents *L. macrocarpella.* Figure 51 more likely illustrates the mine of *Psacaphora terminella,* and not that of a *Cosmopteryx.* The second species mentioned under the family Cycnodiidae (p. 151), the bulrush leaf-miner, is a Gelechiid, *Aristotelia robusta,* and not a species of *Aphelosetia* (*Elachista*); it is referred to its correct position in the list.

The book forms a valuable addition to our entomological literature on a little-known subject, and students owe a debt of gratitude to the authors for gathering together in accessible form this mass of information.—ANNETTE F. BRAUN.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and only when necessary those at the top (being longest in) are discontinued.

For Exchange—A large number of living cocoons of Actias selene, Philosamia cynthia, etc., in winter. Send for list.—Vee Kung Yu, c/o Bureau of Entomology, Kashing, Chekiang Province, China.

For Exchange—South American and Celebes butterflies by 100 monthly arrivals, also South and North American pupae and cocoons. Mrs. Emma Kessler, 499 Manhattan Ave., New York.

Exchange—Northern Idaho Lepidoptera to exchange for exotics or other showy specimens. C. W. Herr, Priest River, Idaho.

Canarian Fauna—For all particulars apply to H. E. Appenhagen, Sta Cruz, Teneriffe, Apartado No. 202.

I am revising the genus *Ceuthophilus* (Orthoptera, Tettigoniidae, Rhaphidophorinae), and will be glad to have material from any part of the country for study and determination. Specimens will be promptly returned.—Theodore H. Hubbell, Museum of Zoology, University of Michigan, Ann Arbor, Michigan.

Lepidoptera from all parts of the world in exchange for rarer Sphingidae, Saturnidae and Bombycidae from the Southern States and Mexico. Send lists of desiderata to Henry Wormsbacher, 1357 St. Charles Ave., Lakewood, Ohio.

Wanted: live pupae of large moths, especially Actias luna, by purchase or in exchange for silkworm eggs.—John H. Gerould, 36 Occom Ridge, Hanover, N. H.

Western Lepidoptera: Sphingidae, Aegeriidae, Cossidae, Catocala and the major Bombycidae in exchange for equally rare species of the same families. Short lists of the *very rare species* only, desired. O. C. Poling, Box 82, Fort Davis, Texas, U. S. A.

Mycetophilidae—Will exchange or identify material in this family. C. F. Adams, Indiana State Board of Health, Indianapolis, U. S. A.

Wanted—"Check List of the Lepidoptera of Boreal America" by Wm. Barnes and J. McDunnough. Kindly quote price. E. J. Dornfeld, 144 North Ave., Milwaukee, Wis.

Wanted—Moths of any species of the genus **Apantesis:** also eggs or larvae. Will determine specimens. Want to hear from anyone who will collect in this genus. Dr. E. T. Learned, Fall River, Mass.

Wanted—Names and addresses of collectors in foreign countries, also some second-hand insect cases. Write Mrs. Robert Milde, Lewiston, Minn.

Catopini—Catops (Choleva), Prionochaeta, Ptomaphagus. Wanted to borrow all possible specimens of these genera from North America for a revisional study. Correspondence solicited. Melville H. Hatch, Dept. of Zoology, Univ. of Wash., Seattle, Wash.

Chrysomelidae—Cryptocephalinae and Halticinae—will exchange insects of other orders for above named leaf-bettles. Also many duplicates in other groups of coleoptera.—Paul N. Musgrave, 514 Mt. Vernon Ave., Fairmont, W. Va.

Argynnis of the world wanted by exchange for local Lepidoptera, or by purchase. S. P. Hayes, Jr., Amherst College, Amherst, Mass.

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